Regional HOT Lanes Network Feasibility Study

APPENDIX G

CORRIDOR ANALYSIS:

I-880 FROM SR-92 TO SR-237

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and

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Introduction

This memorandum applies a project development approach and set of corresponding design principles that were developed in Phase 3 Tasks 22.1 and 22.2 to the specific segment of I-880 from SR-92 to SR-237. Similar memoranda were prepared for other corridors in the proposed MTC HOT lane network. These memoranda are intended both to advance the plans for HOT lane development in the corridors under study and to provide a basis for drawing conclusions about the likely impacts, costs and design issues required to convert or develop HOT lanes in other network corridors not under detailed study.

At the direction of MTC and the Project Steering Committee, this analysis covers two approaches to developing HOT lanes in the corridor, the "Basic Approach"[1] and the "Revised Full Featured Approach"[2]. The primary difference between the two is that in constrained situations the Basic Approach allows for sub-standard inside shoulders and a reduction of lane widths from the 12-foot standard to 11 feet, while the Revised Full Featured Approach would maintain Caltrans design standards. Under exceptionally constrained conditions where freeway widening is infeasible due to cost or environmental reasons then the outside shoulder may also fall below Caltrans' 10-foot standard width for short distances.

This memorandum begins with a description of existing conditions in the corridor, followed by sections describing the proposed typical HOT lane sections and access and egress points, and closes with a section describing the study team's findings regarding development of HOT lanes in this corridor.

Description of Current Conditions in the Corridor

The portion of the corridor under study is 18.5 miles long, running from the interchange with SR-92 to the interchange with SR-237. This section of I-880 is an urban freeway

[1] This is derived from the "Rapid Delivery Approach" in Phase 2b of this study

[2] This is derived from the approach used in Phase 2 of this study, which assumed full Caltrans design standards

passing through the cities of Hayward, Union City, Fremont and Milpitas (see Figure 1). The adjacent land uses are predominantly business parks and small-lot residential subdivisions.

The section of I-880 under study consists of two parts that can be described from north-to-south as:

- From the SR-92 interchange to the Dixon Landing interchange I-880 generally has three general purpose lanes and one HOV lane per direction (see Figure 2). Auxiliary lanes are provided in some locations. This section carries from 220,000 ADT (north end) to 180,000 ADT (south end). I-880 appears to follow Caltrans' design standards in terms of 12-ft lanes and 10-ft outside shoulder widths in most of this section (see Figure 3). However, there is a pinch point at the SR-92 overcrossing at the north end of this section where the inside and outside shoulders have been reduced to 2 feet (see Figure 4). This section is in Alameda County.
- From the Dixon Landing interchange to the SR-237 interchange I-880 has five general purpose lanes plus a new HOV lane in each direction. This section carries 180,000 ADT. I-880 appears to follow Caltrans' design standards in terms of 12-ft lanes and 10-ft outside shoulder widths in this section (see Figure 5). This section is in Santa Clara County.

There are three freeway-to-freeway interchanges in the corridor (SR-92 in Hayward, SR-84 in Union City, and SR-237 in Milpitas) and eleven other interchanges[3].

Other Projects and Studies in Vicinity

This freeway was upgraded in the 1990's. More recent projects and studies have been focused on developing HOV lanes and interchanges:

[3] From north to south these are Tennyson Road, Industrial Parkway, Whipple Road, Alvarado Niles Road, Alvarado Boulevard, Thorton Avenue, Mowry Avenue, Stevenson Boulevard, Auto Mall Parkway, Fremont Boulevard, and Dixon Landing

- The reconfiguration of the I-880 interchange with SR-262 (Mission Boulevard) is nearing completion (see Figure 6). This project added direct connectors between I-880 and Mission Boulevard, a surface arterial that serves as a primary route for traffic transferring between I-880 and I-680. These two freeways run parallel in Fremont and Milpitas without a freeway connection. The project also includes a new overcrossing of I-880 to connect the business districts on either side of the freeway.
- Dixon Landing Road in Milpitas is being widened from four lanes to six. Since the completion of the Dixon Landing interchange, this road has served as a secondary route between I-880 and I-680.
- The southward extension of the HOV lanes from Dixon Landing to SR-237 was completed in late 2008 and was included in the description of existing conditions.
- North of the corridor there is an Alameda County Congestion Management Agency (ACCMA) project to extend the north end of the I-880 HOV lane three miles from Marina Boulevard (about six miles north of SR-92) to Hegenberger Road.
- The extension of the HOV lanes south of SR-237 is under design.
- The Santa Clara Valley Transportation Authority (VTA) Board approved a project in December 2008 to consider converting the existing HOV connectors between I-880 and SR-237 (SB to WB and EB to NB) to HOT operation. This would help alleviate the current situation where the general purpose connector experiences heavy congestion and queuing due to connector metering while the HOV connector is only lightly used. One study suggests that this could generate $38M over twenty-five years.

HOT Lanes Proposal – Mainline

An HOV lane already exists in both directions throughout this corridor, so all that is physically needed for conversion to a HOT lane is to create a 2-foot buffer between the HOV lane and the adjacent general purpose lane and to install appropriate ITS elements, signs, and striping.

For the Basic Approach, the 2-foot buffer would be created by narrowing the HOV lane and the adjacent general purpose lane to 11 feet, in accordance with the tradeoffs listed in the Caltrans *HOV Guidelines*[4]. The other lanes would be unaffected. However, if the HOT lane is expected to be heavily used by buses then it may be better to narrow the two innermost general purpose lanes and leave the HOV lane at 12-foot width.

For the Revised Full Featured Approach, the 2 feet of width needed for the buffer would be created by widening to the outside and then re-striping all of the general purpose lanes to the right.

HOT Lanes Proposal – Ingress and Egress Points

The approach taken in this study is that the placement of ingress and egress points should be primarily demand-driven; that is, ingress points should be located at a convenient distance downstream of places where large volumes of traffic enter the freeway system and egress points should be located at a convenient distance upstream of places where large volumes of traffic leave the freeway system. Once the high-demand locations were identified, an analysis was then performed to determine whether an ingress or egress point could fit within the physical constraints of the location. In the event that the point could not be accommodated, a further analysis was performed to determine whether it could be accommodated by shifting the ingress or egress point to a location near the optimal point. Alternate locations for ingress points were sought downstream of the optimal point while alternate sites for egress points were sought upstream, meaning in effect that traffic wishing to enter or leave the HOT lane would have a longer distance in which to weave across the general purpose lanes. If no alternative site could be found then consideration was given to dropping the proposed site with the assumption that potential users of the point would enter or exit the HOT lanes at other points in the corridor.

The assumed designs of the ingress and egress points are shown in Figures 7 and 8. These designs closely resemble the modified M-5 design for the access points

[4] Source: Caltrans *High-Occupancy Vehicle Guidelines for Planning, Design, and Operations*, August 2003

proposed for the I-680 Sunol Express Lane in Alameda and Santa Clara Counties. Caltrans also has specified a required minimum distance between an HOV access point and the nearest freeway ramps (see Figure 9) that was considered when determining the location of potential ingress and egress areas[5].

Figures 10 through 13 show the volumes of traffic entering and exiting I-880 at various points along the corridor. The observable patterns are summarized below:

- The largest volumes of southbound entering traffic occur at the interchanges with SR-92 and SR-84, and at the Mission Boulevard Interchange, which brings in traffic from I-680 (see Figure 10). This implies the need for ingress points downstream (south) of these locations.
- The largest southbound exiting volumes occur at SR-84, SR-237, and in south Fremont (see Figure 11). This implies the need for egress points upstream (north) of these locations.
- Large northbound entering volumes occur at SR-237, Mission Boulevard, south Freemont, and SR-84 (see Figure 12). This implies the need for ingress points upstream (north) of these locations.
- Large northbound exiting volumes occur at SR-92, SR-84, and Mission Boulevard (see Figure 13). This implies the need for egress points upstream (south) of these locations.

Based on the pattern of entering and exiting traffic, a total of 13 potential sites for ingress and egress were identified for this corridor. Upon further study, one of these sites was moved to avoid a physical constraint; three others were moved to meet the minimum required distance from ramps; and one was dropped because it would duplicate another facility. Table 1 describes the sites and the conclusion for each one. The revised plan is summarized in Figure 14, and shown in detail in Figures 15 through 19.

[5] Source: Caltrans *High-Occupancy Vehicle Guidelines for Planning, Design, and Operations*, August 2003

Findings Regarding HOT Lane Development in this Corridor

Based on this analysis, the development of HOT lanes in this corridor appears to be feasible in both directions. The issue of whether the Basic Approach or the Revised Full Featured Approach should be pursued involves a tradeoff between cost and design features that should be considered at the PSR stage.

Table 1: Summary of Potential Ingress and Egress Points

Site	Traffic Served	Conclusion	Comments on Feasibility
SB-I1	Entering from SR-92 & W Tennyson Rd.	Moved	Moved to a better location to meet the Caltrans' minimum required distance to nearby ramps
SB-E1	Exiting to SR-84	Feasible	Space is available
SB-E2	Exiting to Mowry Ave.	Feasible	End of taper is under Central Avenue bridge
SB-I2	Entering from SR-84	Feasible	Space is available
SB-E3	Exiting to SR-262	Moved	Moved to avoid structures
SB-I3	Entering from SR-262	Feasible	Space is available
NB-I1	Entering from SR-237	Dropped	Not needed; an existing direct connector will be converted to the HOT lane
NB-E1	Exiting to Auto Mall Pkwy.	Moved	Moved to a better location to meet the Caltrans' minimum required distance to nearby ramps
NB-I2	Entering from Fremont Blvd.	Moved	Moved to a better location to meet the Caltrans' minimum required distance to nearby ramps
NB-I3	Entering from Mowry Ave.	Feasible	Space is available
NB-E2	Exiting to SR-84	Feasible	Space is available
NB-I4	Entering from SR-84	Feasible	Space is available
NB-E3	Exiting to SR-92	Feasible	End of taper is under Industrial Parkway W.

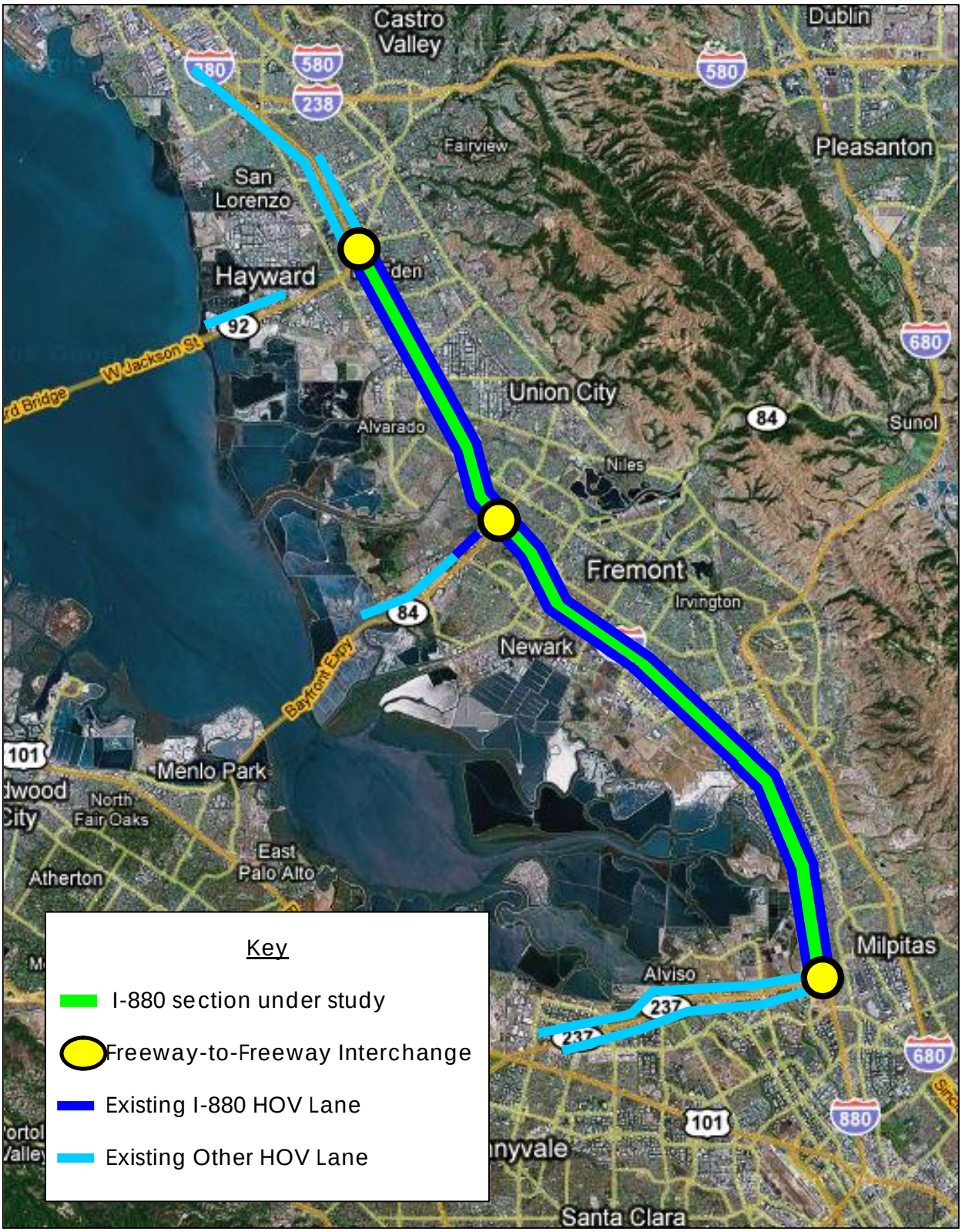

Figure 1: Study Corridor

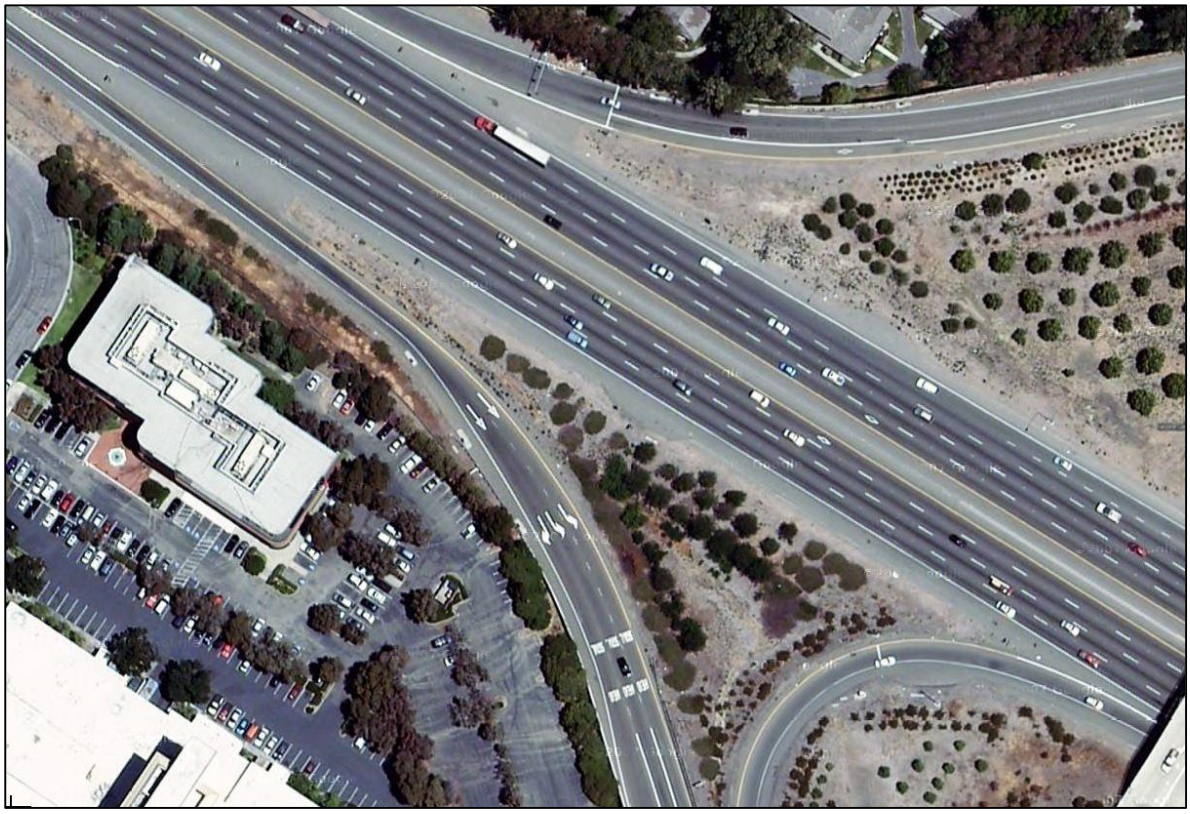

Figure 2: Section of I-880 Southbound just north of Stevenson Boulevard interchange

Figure 3: Section of I-880 Southbound at Central Avenue Overcrossing

Figure 4: Section of I-880 Northbound at SR-92 Interchange

Figure 5: Section of I-880 Southbound Between Dixon Landing and SR-237

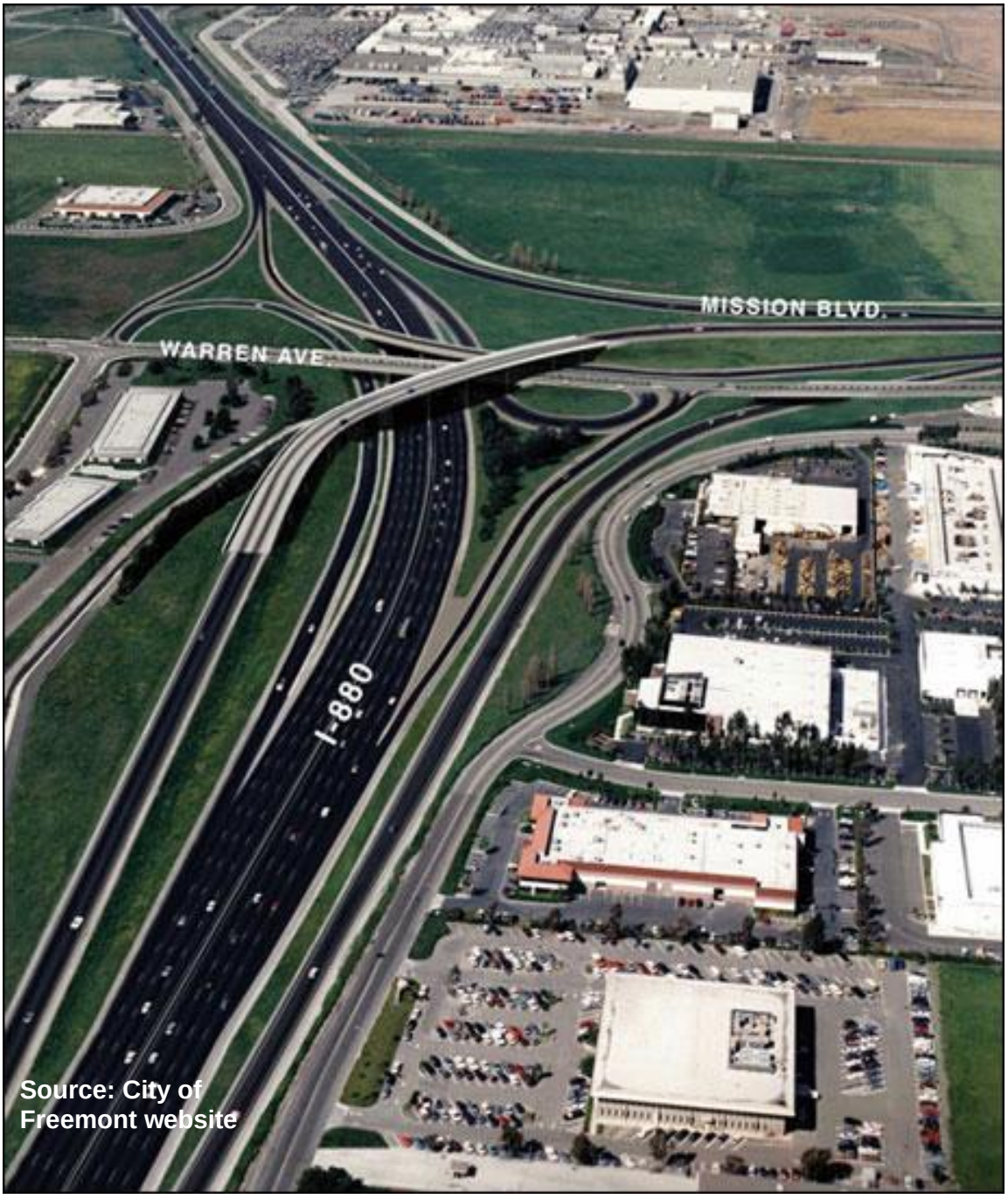

Figure 6: Mission/I-880 Interchange Reconstruction Project

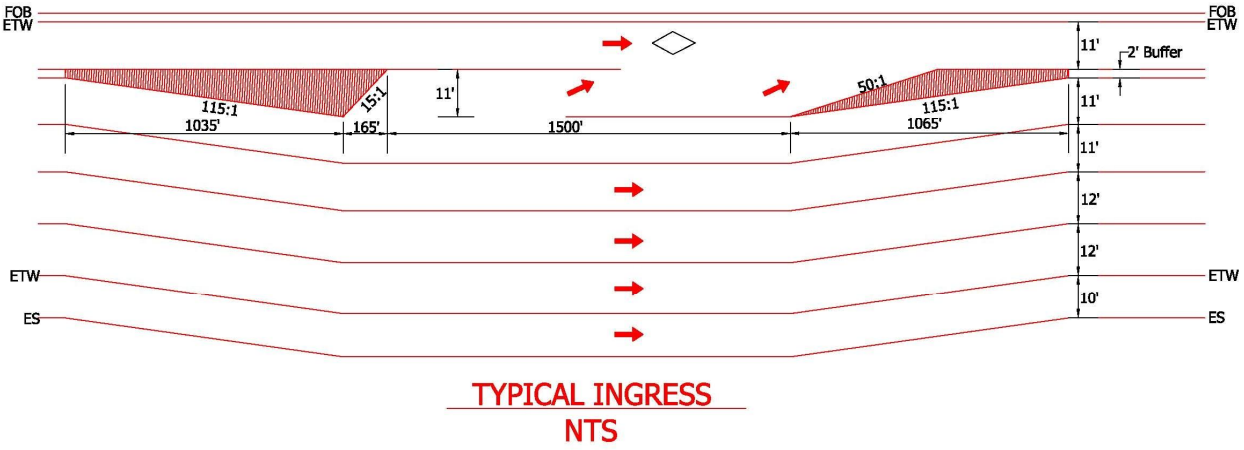

Figure 7: Typical Ingress Point for HOT Lane

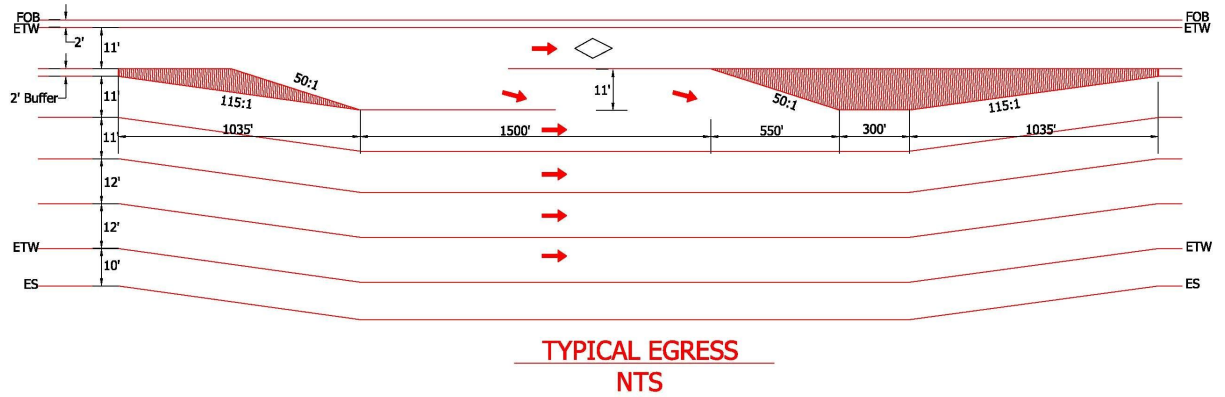

Figure 8: Typical Egress Point for HOT Lane

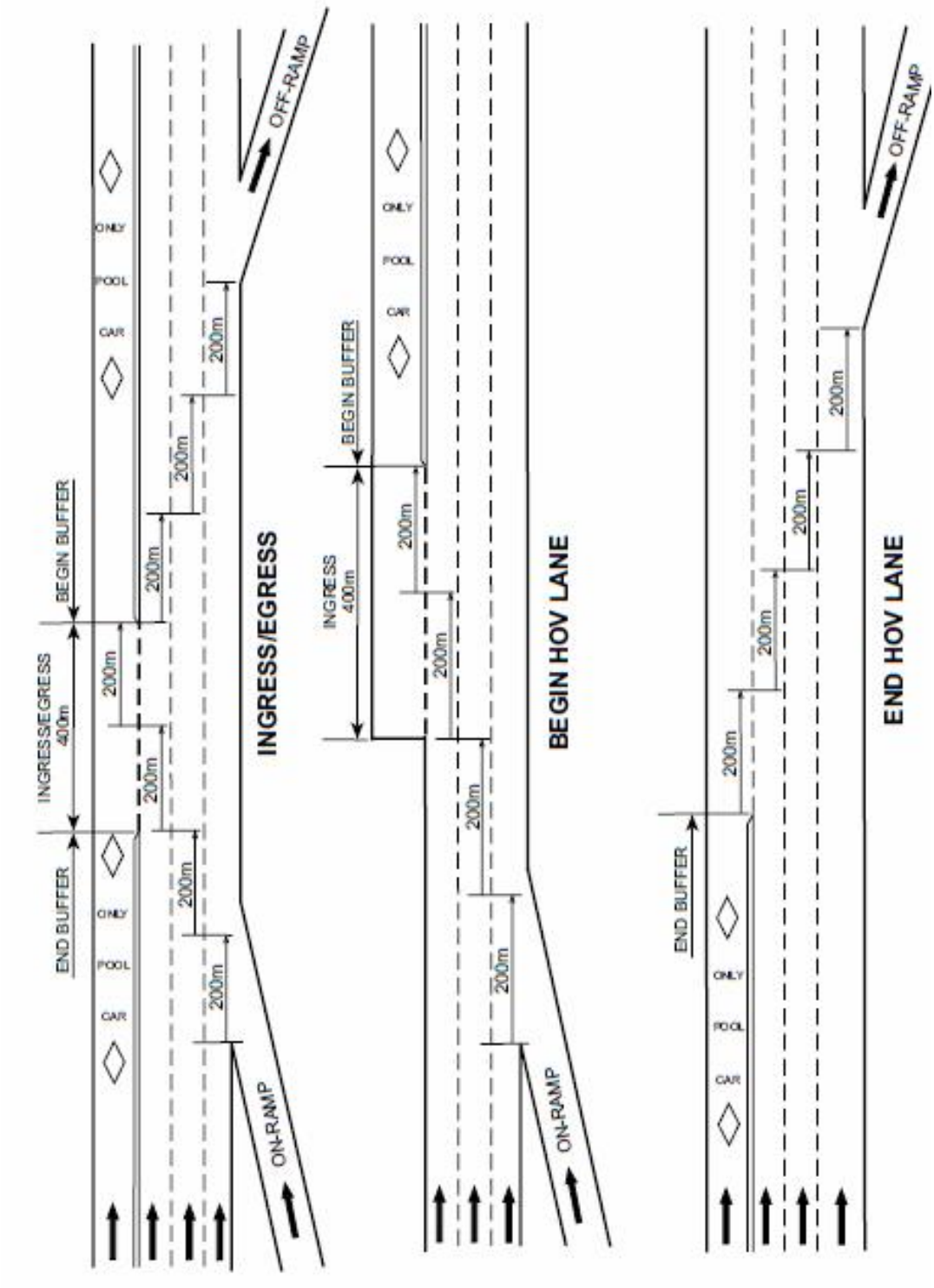

Figure 9: Caltrans Minimum Weave Distance at Buffer-Separated HOV Facilities

Figure 10: Southbound On-Ramp Volumes and Potential Ingress Points

Figure 11: Southbound Off-Ramp Volumes and Potential Egress Points

Figure 12: Northbound On-Ramp Volumes and Potential Ingress Points

Figure 13: Northbound Off-Ramp Volumes and Potential Egress Points

Figure 14: Revised Ingress and Egress Points